Christensen's Disruptive Innovation and Schumpeter's Creative Destruction

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This paper examines the disruptive effect of technology upon society and business, especially as introduced by the theory of creative destruction of Schumpeter (1942), and in industry in *The Innovator's Dilemma* by Christensen (1997). Three reasons are proposed for the emergence of the term *disruptive innovations*. The first is that the cycle or life span of any one product is much shorter and the speed of change much faster. The second reason is increasing globalization and the shift of the economic centre of the world from the West back to Asia. The third reason is that the changes are affecting all levels of society. In the past, disruption first and foremost affected manufacturing industries. Thus, the biggest changes occurred or were largely limited to the blue-collar workforce: what is called the working class in the United Kingdom. However, now the previously unthreatened white-collar domain of the middle-classes, management, and professionally-skilled are finding their positions are no longer sacrosanct, but equally vulnerable. The speed, nature, and extent of change has led to a re-examination of existing arguments and theories to provide frameworks for analysis.

Disruptive

Traditionally when the word disruptive was used, people imagine the context of the school or home. Teachers use it to single out one or two troublesome students who regularly cause, or have caused, chaos, preventing classes from running smoothly. Parents refer to a difficult child or teenager, sometimes not their own, as *disruptive*, when they cause problems at, in, or outside school, at home or among peer groups. In general life, it is most often used when something fails to operate as planned, such rail services being disrupted by extreme weather, strikes, and sometimes suicides.

The term disruptive is also encountered in industry and business. The Financial Times database reveals two different kinds of disruptive behaviour. First, from the nineteenth century onwards disruptive relates to problems of threatened or actual strife and chaos associated with the actions of labour unions. At that time power lay very much in the hands of the factory owners and investors. As such workers' terms and conditions were given scant consideration. Consequently, unions and activists who fought and struggled for workers

rights were considered very *disruptive* and a threat to the status quo and power of the wealthy. In the 1970s and 1980s, a second kind of disruptive usage is encountered in new trade frictions and imbalances. In this area, particularly *disruptive* was the emerging economic power Japan who threatened the status quo and hegemony of the West, especially that of the United States.

The disruptive behaviour or disruption to be discussed here does not relate to problem children, emerging unions or economic powers, but rather to technologies. The fact that new technologies lead to, or have the potential to cause change in society, and as such cause disruption is without question. History has many examples: the printing press, gunpowder, the steam engine, electricity, the motor car. However, most people would consider these to be inventions rather than innovations.

Invention and Innovation

Definitions

The Cambridge Online Dictionary states that an invention is:

i. a product or a way of doing something which has never been made or never existed before.
ii. the process of creating something that has never been made or never existed before.

The Merriam-Webster Dictionary defines invention as:

> something invented: as *(2)*: a device, contrivance, or process originated after study and experiment 'the light bulb was one of the most important *inventions* of the 19th century.'

Wikipedia defines invention, as:

> a patented technological solution (method, apparatus or process), a form, a composition of matter, that is useful and has an element of novelty.... It may be an improvement upon a machine or product, or a new process for creating an object or a result. An invention that achieves a completely unique function or result may be a radical breakthrough. Such works are novel and not obvious to others skilled in the same field. Some inventions can be patented.....

The Cambridge Dictionary says that innovation is:

> 'A new idea or method: the latest innovations in computer technology'.

The Merriam-Webster Dictionary defines innovation as:

> 'the introduction of something new'
> or a new idea, method, or device'

Examples provided are:

> She is responsible for many innovations in her field.
> The latest innovation in computer technology.
> Through technology and innovation, they found ways to get better results with less work.
> The rapid pace of technological innovation.

In distinguishing between the two, Wikipedia states that:

> Innovation differs from invention in that innovation refers to the use of a better and, as a result, novel idea or method, whereas invention refers more directly to the creation of the idea or method itself.

Business Insider states:

> Innovation is distinguished from invention, even if the inventor and innovator is the same person. Innovation is widened to the commercial application and marketing of any new idea. To achieve this commercial application, the innovator/entrepreneur must get financing or credit and convince investors or venture capitalists that profits will be forthcoming in the immediate or near future.

Steve Jobs and Bell

Business Insider states:

> Invention is the "creation of a product or introduction of a process for the first time." Thomas Edison was an inventor. Innovation happens when someone "improves on or makes a significant contribution" to something that has already been invented. Steve Jobs was an innovator. However, Jobs was not an engineer.

Kottke, one of Apple's earliest employees and a college friend of Jobs, stated that:

> "Between Woz [Gary "Steve" Wozniak] and [Steve] Jobs, Woz was the innovator, the inventor. Steve Jobs was the marketing person. (2012)

Thiel, cofounder of PayPal and Palantir, the first outside investor in Facebook, and funder of LinkedIn states:

> It's true that every great entrepreneur is first and foremost a designer.... The greatest thing that Jobs designed was his business.... And Jobs' return to Apple twelve years later shows how the most important task in business — the creation of new value — cannot be reduced to a formula and applied by professionals.... The lesson for business is that we need founders. (2014, p. 79)

Thus, Jobs was never an inventor but was a genius innovator and entrepreneur. Thiel

states, "The paradox of teaching entrepreneurship is that such a formula [for success] necessarily cannot exist; because every innovation is new and unique, no authority can prescribe in concrete terms how to be innovative."

Concerning Bell and the telephone Wu (2012) states:

> And so, while the Bell Company may have invented the telephone, it clearly didn't perceive the full spectrum of its uses. This is such a common affliction that we might call it "founder's myopia." Again and again in the development of technology, full appreciation of an invention's potential importance falls to others — not necessarily technical geniuses themselves — who develop it in ways that the inventor never dreamed of. (p. 47)

In fact, it was the great and infamous JP Morgan who invited a disillusioned Vail back from South America to take control of Bell Company. Vail, with Morgan's backing, created the monopoly and empire now known as AT&T. But neither of them were inventors.

Disruptive Innovation

Google Advanced Search shows 561,000 usages for *disruptive* and *innovation* to be found in 45,600 books. For academic institutions and universities, adding *MOOCs* (Massive Open Online Courses) to *disruptive* and *innovatio*n provides 35,900 references. The Times [UK] database from 1992 to 2014 provides 196 references to the words disruptive and innovation being in the same article. However, there is a distinct difference between precentennial 1990s and the 2000s. Google shows increasing usage of *disruptive innovation* from 1995. The following quotes

> [Education] Everyone's going MOOC-crazy these days. From frequent media coverage of online courses and platforms like Coursera, edX, Udacity, and Udemy to discussions about the complexities and business models of online education, the excitement around MOOCs (Massive Open Online Courses) has finally "bubbled" over. The question is not just whether MOOCs are going to *disrupt* traditional education, but how? Is it just about lower costs and access? Is it really going to be a Napster-like moment with entrenched "Teamsters in tweed" worried about the erosion of their research, publishing, and teaching? .... But First: Are MOOCs Really '*Disruptive*' ?
>
> Yes, the word "disrupt" is overused. But it has a specific meaning when we're talking about it. And MOOCs do bear the early hallmarks of *a disruptive innovation.* Horn, & Christensen. (2013)

> [Education] As for the "*disruptive innovations*" he commends, any fool can create disruption but only a fool would do that when dealing with the education of this

country's children. .... Sir, James O'Shaughnessy says he has bet his career on ceasing to be a policy wonk and starting "a new social business" dedicated to, among other things, advocating "*disruptive innovations*" to help bring about education reform. Many thousands of competent teachers — some of whom are "activists" but most are not — will say that they bet their careers on classroom teaching, and that the last thing schools and classroom teachers need is "*disruptive innovation*". That is precisely what schools and teachers have had to put up with — in the guise of numerous "initiatives" — from successive governments, and their policy wonks, over many years. Minterne (2012)

[Products] Barker's strategy is a classic example of *disruptive innovation* — improving a product or service in a way that the market does not expect. Competitors offering similar monitoring software keep increasing the complexity of their products. He has made his site as easy to use as possible. Midgley (2011).

[HR Human Resources] What do you look for in hiring senior staff? The ability to unlearn and re-learn. Bright people can do this intuitively. There's a trenchantness these days in a lot of people who believe in a way of doing stuff that isn't appropriate for a world beset by *disruptive innovation*. You can be an excellent candlemaker but if someone invents the lightbulb, you are worthless. Cook (2010).

[The Internet] The demand for carbon-free power is about to become the most *disruptive* force in business since the Internet. And *disruptive innovations* have a way of knocking flat even the most entrenched companies. Five years ago Google was tiny, just starting to sell adverts based on clicks. Ten years ago, Nokia was still thought of as a Finnish paper company. Twenty years ago Dell was a small business selling computers through geeky magazines. These companies came to dominate the market not because the established companies were stupid — not at all — but because they couldn't quite bring themselves to turn their processes upside down. Cavendish (2006)

[Google vs. European Union] Mr. Schmidt said: "New businesses promoting new ideas should not be held back by bureaucratic or regulatory hurdles. If everything stays the same, innovation will be stifled and start-ups strangled." Old businesses should be forced to innovate through direct competition with new technologies, he said. "Success is never guaranteed, especially in an area as competitive and fast changing as technology, but Europe has all the right ingredients. It must redouble its commitment to the single market and steel its nerve to permit *disruptive innovations*. "If the new European Commission manages to introduce effective reform, Europe will play a leading role in the global digital economy and be a better place to work and live." Dean (2014)

Thus, the inventor, the innovator, and entrepreneur are different. These new technologies and innovations do disrupt companies and society. One major framework for anaylsing the effects of such changes is the work of Schumpeter: creative destruction and the Cycle.

Creative Destruction

In *The Worldly Philosophers* (Heilbroner, 1953) Schumpeter was only one of five economist to earn a chapter to himself. The others were Adam Smith, Marx, Keynes, and Veblen. Schumpeter's fundamental question was 'Why does economic development proceed cyclically rather than evenly?' (xxvii). *The Theory of Economic Development* was published in 1934, as the world was emerging from the Great Depression. Schumpeter's final chapter 'The Business Cycle' concluded a detailed analysis. The answer to his own question was that "innovations are not evenly distributed in time but appear, if at all, discontinuously in groups or swarms" (p. 223).

Attempting to 'fuse everything he had learned about capitalism' (xvii) he published a two volume work *Business Cycles* (1939). In 1942, he published *Capitalism, Socialism, and Democracy*. It is in this work, Chapter 7, that he introduces 'The Process of Creative Destruction'. Schumpeter's theory of economic development argues that capitalism is an evolutionary process. He is critical of economists,

> Who, ex visu [on sight] of a point of time, look, for example, at the behavior of an oligopolist industry — an industry which consists of a few big firms — and observe the well-known moves and countermoves .... They accept the data of the momentary situation as if there were no past or future. The problem is being visualized is how capitalism administers existing structures, whereas the relevant problem is how it creates and destroys them. (1942: 84)

Schumpeter argued that at the base level 'innovation and economic growth are one and the same. Countries that innovated would grow wealthier; those that did not would stagnate' (Wu, 2011: 27). Schumpeter regarded this as a ruthless cycle of industrial destruction and birth. As such, rather than being some benign gentle process, it is one of annihilation. Thus, the new rarely supplements the old; it destroys it. Schumpeter outlines a concept of competition different from that of Adam Smith. Adam Smith presented a concept of price warfare, undercutting competitors and improving the markets' overall efficiency. However, Schumpeter argues,

> In capitalist reality, as distinguished from its textbook picture, it is not that [Adam Smith's] kind of competition that counts ... [but rather] the competition from the new commodity, the new technology, the new source of supply, the new type of organization. (Wu, op cit p. 28)

One main difference between Schumpeter and Adam Smith is that Smith is addressing market theory and microeconomics, whereas Schumpeter is addressing macroeconomics and capitalism.

Schumpeter argues that a model which presents a stationary circular flow fails to accommodate or explain the cyclical nature of capitalism with its cycles, recessions, and sometimes full-blown depressions. Summarizing Schumpeter's position, Elliot (2012) states,

> Schumpeter's concept of economic development has three salient characteristics: it comes from within the economic system and is not merely an adaption to change in external data; it occurs discontinuously, rather than smoothly; it brings qualitative changes or 'revolutions', which fundamentally displace old equilibria and create radically new conditions.... The strategic stimulus to economic development in Schumpeter's analysis is innovation, defined as the commercial or industrial application of something new — a new product, process, or method of production; a new market or source of supply; a new form of commercial, business, or financial organization. (p. xix)

Schumpeter argues that innovation faces immense difficulties.

> First, the knowledge necessary for entrepreneurial decisions lies outside the known and accurate data of the circular flow and this is shrouded in uncertainty. Second, objective uncertainty is compounded by subjective reluctance of individuals to strike out into the unknown. Third, there is antagonism from the non-innovators towards the pioneer — in the form of legal arid political obstacles, social mores, customs, and the like. It takes a special kind of person to overcome these difficulties. In contrast to the 'economic man' who carefully calculates marginal cost and revenues of alternative courses of action on the basis of known data, the entrepreneur must be a man of 'vision', or daring, willing to take chances, to strike out, largely on the basis of intuition, on courses of action in direct opposition to the established, settled patterns of the circular flow. The entrepreneur is more of a 'heroic' than an 'economic' figure: he must have 'the drive and the will to found a private kingdom'. (Elliot p. xxi)

Entrepreneurs, financed by bank credit, make innovative investments embodying new technologies, resource discoveries, and so on. If these are successful, imitators follow, in the original industry. Successful innovations encourage secondary innovation and the economy booms. Eventually, innovations are completed and investment slows down; a large amount of consumer goods flood the market depressing prices; rising costs and interest rates reduce profit margins: and the economy suffers a slow down or negative GDP. Hence it goes into recession.

McCraw (2008) offers some reasons as to why Schumpeter's arguments did not receive

so much attention. The main reason is that Keynes' macroeconomic insights and models were attractive as an apparently successful solution to the economic problems of the time. Schumpeter 'disagreed with Keynes' top-down approach to economic policy, believing it to be too heavily weighted to government intervention and far too dismissive of capitalist innovation (p. xxix).

McCraw continues,

> The Age of Keynes ended during the 1970s, when economic growth slowed almost everywhere and very high inflation afflicted the world. In the 1980s there began a spirited revival of Schumpeter's ideas, fueled by the deregulation of many industries and the privatization of nationalized firms .... The Age of Keynes was about to be replaced by the Age of Schumpeter. In the 1990's, there came a worldwide outburst of attention to entrepreneurship and innovation. Rapid progress in many industries — synthetic chemicals, pharmaceuticals, and above all information technology, symbolized by personal computers and the Internet — testified to the infinite possibilities of Schumpeter's topic: capitalist innovation. By the twenty-first century, citations of his works by journalist and scholars — especially to *Capitalism, Socialism, and Democracy* — began to outnumber those of Keynes's works, a situation that would have seemed impossible a few decades before. (p. xxx)

Summarising, Schumpeter was an economist of the twentieth century whose work on capitalist innovation was disregarded or overlooked. Now, especially since the 2008 financial crisis, some of the standard economic analyses have been perceived insufficient or inaccurate. This has prompted students of economics in the UK to openly protest that their courses and lectures are failing to provide adequate knowledge and preparation for the real world, which is another reason why Schumpeter's arguments have been resurrected. The following section of Christensen's research on innovation looks at the ever shortening of lifespan of products and industry cycles.

The Innovator's Dilemma

The emergence of the term disruptive innovation is attributed to the book by Christensen *The Innovator's Dilemma* (1997). It was first used in an article entitled *Disruptive Technologies: Catching the Wave* by Bower and Christensen (1995). Strictly speaking, in the book Christensen uses the terms *disruptive technological innovations* and *disruptive technological change*. Because of the length of the term, and more importantly because innovation is not restricted to technology, the more common usage has become *disruptive innovation*. Christensen gives credit to Schumpeter in the new preface of the second edition (2010).

> Another scholar who joined me in the study of this [disruptive technology] phenomenon, Michael Raynor of Deloitte Research, has noted that disruptive

> technology is probably the cause behind the "creative destruction" that the economist Joseph Schumpeter observed to be the primary engine of economic progress more than half a century ago. (xxxiv)

Christensen seeks to answer two questions, first "Why is success so difficult to sustain?" And second "Is successful innovation really as unpredictable as the data suggest?" His study focuses on changes in i. disk drive industries, ii. mechanical excavator industries, and iii. integrated steel companies and minimill steel makers. He shows why most companies miss out on or ignore emerging technologies and innovations. Rather than simply criticize companies for this, he praises the capable leadership of companies.

> There is something about the way decisions get made in successful organisations that sows the seeds of eventual failure .... In the cases of well-managed firms, good management was the most powerful reason that they failed to stay atop their industries. (p. xv)

This paradox created by new technologies presents a dilemma. The dilemma is that "the logical, competent decisions of management that are critical to the success of their companies are also the reasons why they lose their positions of leadership" (p. xvi). Analysing why and under what circumstances new technologies have caused great firms to fail, Christensen prescribes

> managerial solutions to the dilemma — how executives can simultaneously do what is right for the near-term health of their established businesses, while focusing adequate [sufficient] resources on the disruptive technologies that ultimately could lead to their downfall. (op. cit)

He creates or builds a *failure framework* and examines why and how good management can lead to failure. He concludes that there are three main findings.

Sustaining versus Disruptive Technologies

There is a strategically important distinction between 'what I call *sustaining* technologies and those that are *disruptive*.' (p. xvii). All sustaining technologies improve the performance of established products. However, in his studies it was always the disruptive technology that led to the failure of leading firms.

> Disruptive technologies bring to a market a very different value proposition than had been available previously. Generally disruptive technologies underperform established products in mainstream markets. But they have other features that a few fringe (and generally new) customers value. Products based on disruptive technologies are typically cheaper, simpler, smaller, and frequently more convenient to use.

(p. xviii)

Christensen gives examples of disruptive technologies, such as the small off-road motorcycles of Honda Kawasaki and Yamaha, which displaced the powerful Harley-Davidson and BMW bikes, and how transistors were disruptive technologies to vacuum tubes. In the section 'Lessons for Spotting Disruptive Threats and Opportunities', he provides a table of examples (p. xxix). See Table 1.

Table 1

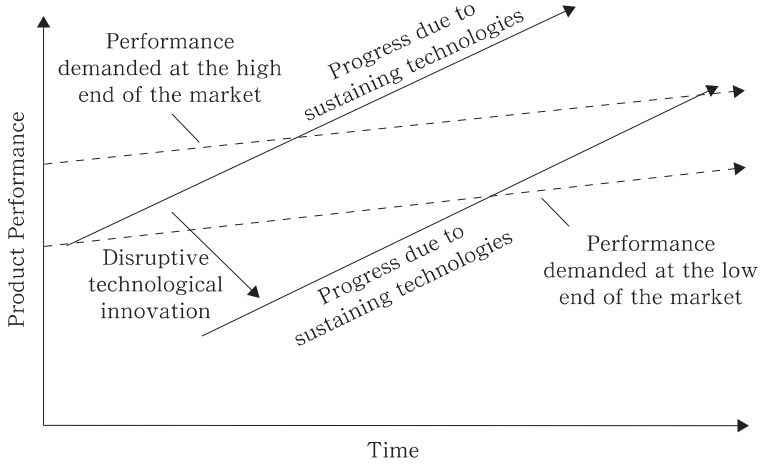
ESTABLISHED TECHNOLOGY	DISRUPTIVE TECHNOLOGY
Silver halide photographic film	Digital photography
Wireline telephony	Mobile telephony
Circuit-switched telecommunications networks	Packet-switched communications networks
Notebook computers	Hand-held digital appliances
Desktop personal computers	Sony Playstation II, Internet appliances
Full-service stock brokerage	On-line stock brokerage
New York & NASDAQ stock exchanges	Electronic Communications Networks (ECNs)
Full-fee underwriting of new equity and debt issues	Dutch auctions of new equity and debt issues, conducted on the Internet
Credit decisions based upon the personal judgment of bank lending officers	Automated lending decisions based upon credit scoring systems
Bricks & mortar retailing	On-line retailing
Industrial materials distributors	Internet-based sites such as Chemdex and E-steel
Printed greeting cards	Free greeting cards, downloadable over the Internet
Electric utility companies	Distributed power generation (gas turbines, micro-turbines, fuel cells)
Graduate schools of management	Corporate universities and in-house management training programs
Classroom and campus-based instruction	Distance education, typically enabled by the Internet
Standard textbooks	Custom-assembled, modular digital textbooks
Offset printing	Digital printing
Manned fighter and bomber aircraft	Unmanned aircraft
Microsoft Windows operating systems and applications software written in C++.	Internet Protocols (IP), and Java software protocols
Medical doctors	Nurse practitioners
General hospitals	Outpatient clinics and in-home patient care
Open surgery	Arthroscopic and endoscopic surgery
Cardiac bypass surgery	Angioplasty
Magnetic resonance imaging (MRI) and Computer Tomography (CT) Scanning	Ultrasound—initially floor-standing machines, ultimately portable machines

Trajectories of Market Need versus Technology Improvement

Companies, in trying to remain ahead of their competitors, tend to offer customers more than they need or than they want to pay for. This is overkill or what Christensen calls 'when suppliers overshoot their market'. A disruptive technology arrives, maybe with poorer performance. However, often it becomes fully performance-competitive in a short period. See Figure 1.

He cites the performance of mainframe computers which had surpassed the needs of many customers, who were satisfied with desktop or even laptop machines. Similarly shoppers who felt that in the 1960s had to shop at department stores to be guaranteed good selection and quality, now found that Wal-Mart sufficed.

Figure 1 The Impact of Sustaining and Disruptive Technological Change



Disruptive Technologies versus Rational Investments

The third part of the failure framework concludes that investing aggressively in disruptive technologies is not a rational decision for three reasons. First, such disruptive products are usually simpler and cheaper and therefore do not provide greater profit. Second, generally such technologies are first used in emerging or small markets. Third, companies "most profitable customers usually are not interested and cannot use products based on such disruptive technologies".

Five Principles of Disruptive Innovation

From the 'failure framework' Christensen provides five principles of disruptive innovation

> to help managers pilot their companies through a 'disruptive technology' storm … so that they can understand, harness or accommodate these technology changes. To see what has what has caused those circumstances and what forces will affect the feasibility of their solutions. (xxiii)

The first principle is that companies depend on customers and investors for resources. The dilemma here is that companies find it very difficult to invest "adequate resources in disruptive technologies — lower market opportunities that their customers [and investors] don't want — until their customers want them. And by then it is too late." (p. xxiv). Their main suggestion is that managers set up or create an autonomous or independent organization.

The second principle is that small markets do not solve the growth needs of large companies. There is strong evidence that companies entering emerging markets early have first-mover advantage. However, many large companies 'adopt a strategy of waiting until new markets are "large enough to be interesting" (p. xxiii). Christensen provides evidence why this is not often a successful strategy.

The third principle is that markets that do not exist cannot be analysed. Planning and marketing techniques that were developed to handle sustaining technologies do not work. "It is in disruptive innovations where we know the least about the market, that there are such strong first-mover advantages. This is the innovator's dilemma." (p. xxvi).

The fourth principle is that an organization's capabilities define its disabilities. First, companies' methods use labour, energy, materials, information capital and technology to gain higher value and profit. Second, company values or thinking have a criteria for prioritizing decisions. However, these methods [processes] and values are not flexible. "The very processes and values that constitute an organisation's capabilities in one context, define its *dis*abilities in another context" (xxvii).

The fifth and final principle is that technology supply may not equal market demand. The customer's product choice is initially on performance. However, when performance improves way beyond what customers need, the selection criteria moves from functionality [performance] 'to reliability, then to convenience, and, ultimately to price.' Companies develop better quality product and move up market. However,

> In doing so, they create a vacuum at lower price points into which competitors employing disruptive technologies can enter. Only those companies that carefully measure trends in how their mainstream customers use their products can catch the points at which the basis of competition will change in the markets they serve. (p. xxviii)

These five principles are the basis from which Christensen examines the history of the industries of disk drives, mechanical excavator, and steel makers, to help in two ways. First, to enable managers identify whether their markets or businesses are targets for, or threatened by disruptive technologies, and how they can prevent or defend against such attacks. Second, to help entrepreneurs and investors "identify possible disruptive technologies around which new markets can be built." (p. xxx).

Resources, Processes, Values Framework (RPV)

In chapter eight 'How to Appraise Your Organisation's Capabilities and Disabilities', Christensen provides a guidelines for analysing the Resources, Processes, Values (RPV) framework. Resources he states "are the most visible of the factors that contributes to what an organization can and cannot do" (p. 186) Resources include people, equipment, technology, product designs, brands, information, cash, and relationships with suppliers, distributors, and customers. "Yet resource analysis clearly does not tell a sufficient story about capabilities" (p. 187). Concerning processes, organizations create value as employees transform inputs of resources into products and services of greater worth. "Patterns of interaction, coordination, communication and decision-making through which they accomplish these transformations are *processes*." (p. 187.) They vary, not only in purpose, but also in visibility. Some are formal; others are informal. *Values* are the standards by which employees make prioritization decisions. A company's values "must reflect its cost structure or its business model, because these define the rules its employees must follow in order for the company to make money." (p. 189.) The values of successful firms operate in two dimensions: first, acceptable gross profit margins, and second how big a business has to be in order to be interesting.

In the history of disc drives Christensen found that only five of 116 were disruptive innovations. 111 were sustaining technologies.

> There was no new technology involved in these disruptive products. Yet none of the industry's leading companies remained atop the industry after these disruptive innovation entered the market — their batting average was zero. (pp. 191–192)

Christensen examines the disk drive, mechanical excavator, and steel industry's product life cycles before asking how can one know if a technology is disruptive and then suggests strategies. Christensen must be credited with presenting a detailed examination of three product industries and how innovation affected these industries. However, it has been almost twenty years since Christensen published *The Innovator's Dilemma*. He states that others have examined how their industries "are being disrupted". In his conclusion to the introduction to the 2011 edition he writes "the Internet looms as an infrastructural technology that is enabling the disruption of many industries." (p. xxxi).

In the introduction to this paper, the reasons given for the emergence or need for the term *disruptive innovation* were shorter product life cycles, globalisation, and the widening negative impact of change upon the white-collar and professional upper-middle classes. These factors have been exacerbated by the paradigm-shift effect of the Internet. As such disruption is inevitable. However, two points need to be emphasised. First, Christensen's original usage was *disruptive technological innovations*. Later, he developed the *disruptive innovation* principles. Second, with so much change occurring, there is a tendency to widen the meaning or to overuse the term disruptive.

Discussion

Cycles

Schumpeter was an economist that was not considered worthy of discussion in any of my economics or economic history courses at university. Maybe this was because, as Elliot (2010) stated earlier, my era of the 1970s was still the Age of Keynes. The rapid bursts of entrepreneurship and innovation of the 1990s are better suited to Schumpeter's theory of the business cycle of creative destruction. Schumpeter's comprehensive macro analysis of society structure and change does not examine particular life cycles. Wu (2011) argues that in the cases of radio, television, and film, creative destruction can be prevented or restricted by actions of vested interests i.e. companies or investors who are content with and do not want to lose the profits that sustaining innovations bring. Companies will seek to implement what Wu calls the *Kronos Effect* taken from Greek mythology, where the stronger seek to kill or 'eat the child' so that in the future it does not become a challenge 'a disruptive technology or innovation'. Political or administrative methods used to kill these are lobbying, restrictive legislation that favours the status quo, establishing 'independent' commissions that have an inherent bias, forcing the start-ups or new disrupters into long legal court cases over patents or more recently intellectual property. Similarly cartels, cabals, and monopolies use pricing methods to prevent David overcoming Goliath. A further financial dirty strategy is simply to prevent or block the disruptive upstart from receiving the necessary financing or capital. Both investors and legislators are fairly fickle and easily wooed if arguments are persuasive and rewarding.

As stated above, Schumpeter does not look at specific industries and his philosophy contains no examples of the industrial warfare and combat techniques just mentioned. However, the quotes from Schumpeter do indicate that he was very aware of how problematic the process of successful innovation of a new technology is.

Christensen's study does not talk of Kronos, or whether companies deliberately seek to interfere with, block or destroy other companies. However, the threat is the same: a failure to invest in or develop a new technology, expand or maintain a market share risks being 'eaten' in the future. The problem is that decisions about future products cannot always be based on made on present data. A potentially successful disruptive technology or innovation is not always identifiable or recognised. Christensen himself said that the iPod would fail.

The life span or cycle of any one technology is much shorter was one of the three reasons offered at the beginning as to why the term disruptive innovation has become widely used. The other reasons were globalisation, and that change is affecting not only the blue-collar workforces, but also all white-collar and even the professional classes and upper management. That more and rapid change is occurring is not in question but what is disruptive?

Disruption

The work of Schumpeter has been gaining acceptance. Christensen's disruptive

innovation has been under attack for being overused. As stated earlier, actually Christensen used disruptive technology innovation with a narrow definition.

> Christensen defined "disruptive innovation" as the process by which "technologically straightforward" services and products target the bottom end of an established market, then move their way up the chain until, eventually, they overtake the existing market leaders.

Maxwell Wessel (2013) writes: "If a start-up starts launches a better product, at a higher margin, to an incumbent's best customers — that's not disruption. That's just … innovation." Roose (2014) provides a second criticism.

> Its [disruption] use as an all-purpose rhetorical bludgeon can distract us from the real issues with emergent products and companies. Frequently, when start-ups working in heavily regulated industries encounter resistance from lawmakers or industry overseers, the concept of disruption is invoked almost instinctively. "But we're disruptive!" the start-up pleads. "How can you be against disruption?"

Consequently

> When every new innovation is cast as disruptive, there's no way to distinguish between legitimate opposition and mere protectionism..... I'm not opposed to the concept of disruptive innovation, just the incessant droning on about it, and the unfortunately common practice among corporate executives of blindly waving the flag of disruption instead of engaging in real discussions about their creations.

Jill Lepore (2014) launched a long scathing attack in the *New Yorker* 'The Disruption Machine: What the gospel of innovation gets wrong.' This is a unusually open battle and spat between academics. Lepore is a professor of American history at Harvard University and chair of Harvard's History and Literature Program. Christensen is Professor of Business Administration at the Harvard Business School. Oremus succinctly summarizes the 6000 word article:

> The true aim of her story is to cut down to size a concept that has ballooned in the business lexicon from specific description to all-purpose justification. "Disruption is a theory about why businesses fail," she writes. "It's not more than that." (2014)

Of disruptive innovation, Oremus concludes

> Lepore's cherry-picked counterexamples don't definitively overthrow Christensen's theory any more than his own cherry-picked examples definitively prove it. Over-

> used and reified as the phrase "disruptive innovation" has become, it remains useful as a descriptive model for understanding how incumbent businesses can sometimes struggle to fend off smaller startups peddling seemingly lower-quality products.

Naughton, technology columnist of the London Observer newspaper and Professor of the British Open University, thinks it is time to be finished with the term. The title of his article (2014) was 'Clayton M Christensen's theory of 'disruption' has been debunked. Can we all move on now, please?' "Business guru Clayton M Christensen's big idea of 'disruptive innovation' has been distorted out of all recognition". Thiel (2014) in *Zero to One* includes a section 'Don't Disrupt' arguing that "Silicon Valley has become obsessed with "disruption"" and continues

> The act of creation is far more important than the old industries that might not like what you create. Indeed if your company can be summed up by its opposition to already existing firms, it can't be completely new. (pp. 56–57)

Limiting discussion and terminology to *disruptive technology* does not help. Searches for the term lead back to Christensen's innovation. The WhatIs.com site states, 'A disruptive technology is one that displaces an established technology and shakes up the industry or a ground-breaking product that creates a completely new industry.' (2014). However, the site then continues to explain Christensen's *The Innovators Dilemma*. In Wikipedia a search for disruptive technology simply redirects you to disruptive innovation.

Conclusion

This study was prompted by the work of Wu, who uses Schumpeter's theory of creative destruction and Christensen's analysis of the phenomenon of disruptive innovation, macro and micro respectively, to help understand change resulting from new technologies. Wu uses these as a framework for his examination of the history of the American information industry, his fear being potential threats to the freedom of the Internet. Schumpeter's Cycle and Christensen's disruption both consider innovation to be the key. In this they recognize the importance of the role of the investor, entrepreneur, and management and type of organization. However, Schumpeter does not give enough credence to the power or ignorance of government and the manipulations of big business to distort the Cycle. Christensen's work focuses on company profits and survival, and is useful as we see the traditional media information industries of newspapers, radio, film, and TV struggling to find new business models. However, the use of disruptive innovation has now become too broad diluting the original meaning. If 'disruptive' is to be used, it should be restricted to how firms can use a new technology to introduce a low-end product at low prices, improve the product over time, and eventually overtake the quality products offered by the older larger companies using older technologies.

Neither Schumpeter and nor Christensen identify the need for a separation between infrastructural and proprietary technologies. Christensen refers only once to the Internet (p. xxxi) and calls it an infrastructural technology. Such technologies offer far more value when shared than when used in isolation. Christensen's work examines proprietary technologies, which are owned, actually or effectively, by a single company. Such ownership can bring massive value-added profits. To achieve this, Thiel and Masters (2014) identify a proprietary technology as being the first and most important quality for achieving a monopoly situation.

Infrastructural technologies are different, being similar to the old concept of 'common carriage' for example when toll roads were abolished. The benefits to society and all industries are greater when usage is open and not restricted or monopolised. The Internet has caused massive disruptions and allowed incredible innovations on a Schumpeter creative destruction scale. However, the Internet is not a product. It is a 'common carriage' public utility system for information and communication. The Internet companies wish to make profits, but also need to have a sense of civic duty or responsibility. In a globalised world this is difficult to achieve, but is the reason that Wu argues for 'net neutrality' in order to avoid companies gaining a monopoly over parts of the Internet.

As this paper was being completed two important issues of Internet infrastructural technology are in the news. First, President Obama has been making the protection of net neutrality one of the things he wishes to be remembered for in his last two years of office. Second, the European Union is threatening to demand the separation and break-up of Google's monopoly-like search engine from other parts of the company. If Schumpeter were alive, he would certainly be giving analysis and opinion on the development and the effects of such technologies. However, he would not be using Christensen's term 'disruptive innovations'. If not, would it be 'creative destruction' ?

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